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(54) **PCI-E CONNECTOR COVER AND PCI-E CONNECTOR MODULE**

(57) A PCI-E connector cover includes a first, a second cover laterals, a plurality of bending arms, a cover top surface and a plurality of connecting posts. The first, the second cover laterals and the cover top surface are adapted to cover a first, a second connector laterals and a connector top surface of a PCI-E connector. The bending arms are connected to the first cover lateral and lean

against a first connector concave of the PCI-E connector so as to keep an interval between the first cover lateral and the first connector concave. The cover top surface is connected to the first, the second cover laterals. The connecting posts are extended from the first and the second cover laterals to fix to a main board. A PCI-E connector module is further provided.

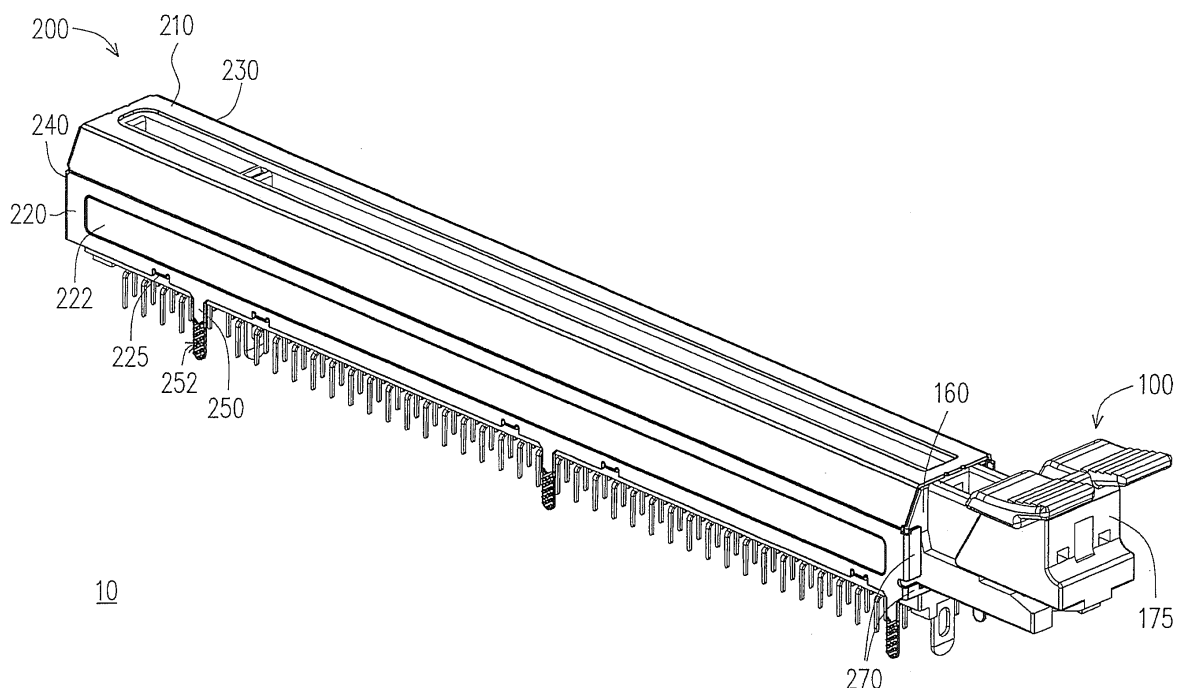


FIG. 4

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The invention relates to a connector cover and a connector module, and particularly relates to a PCI-E connector cover and a PCI-E connector module.

Description of Related Art

[0002] Along with quick development of technology, performance of expansion devices in a computer host is continuously improved. Taking a display card as an example, it produces a large amount of heat during a high performance operation, and in order to improve a heat dissipation effect, the display card sold in the market is generally configured with a fan at one side thereof, so as to quickly dissipate the heat produced by chips on the display card in a convection manner. However, since a weight of such type of the display card is relatively high, when the display card is plugged to a connector on a main board, a casing of the connector is probably cracked.

SUMMARY OF THE INVENTION

[0003] The invention is directed to a PCI-E connector cover, which protects a PCI-E connector to decrease a chance of cracking the PCI-E connector.

[0004] The invention is directed to a PCI-E connector module, which has the aforementioned PCI-E connector cover.

[0005] The invention provides a PCI-E connector cover, which is adapted to cover a PCI-E connector and fixed to a main board. The PCI-E connector includes a connector top surface and a connector bottom surface opposite to each other, a first connector lateral and a second connector lateral opposite to each other, a third connector lateral and a fourth connector lateral opposite to each other. The first connector lateral includes a first connector concave and a plurality of connector protrusions, and the second connector lateral includes a second connector concave. The PCI-E connector cover includes a first cover lateral, a plurality of bending arms, a second cover lateral, a cover top surface and a plurality of connecting posts. The first cover lateral is adapted to cover the first connector lateral. The bending arms are connected to the first cover lateral and adapted for lean against the first connector concave to keep an interval between the first cover lateral and the first connector concave. The second cover lateral is adapted to cover the second connector lateral. The cover top surface is connected to the first cover lateral and the second cover lateral, and is adapted to cover the connector top surface. The connecting posts are extended from the first cover lateral and the second cover lateral, where the PCI-E connector

cover is adapted to be connected to the main board through the connecting posts.

[0006] In an embodiment of the invention, the bending arms are extended from an edge of the first cover lateral and are bended towards the first connector concave.

[0007] In an embodiment of the invention, the bending arms are formed by cracking and bending a plurality partial regions of the first cover lateral at non-edge areas, such that the first cover lateral has a plurality of cracking holes besides the bending arms.

[0008] In an embodiment of the invention, the bending arms contact or do not contact the connector protrusions of the first connector lateral.

[0009] In an embodiment of the invention, the first cover lateral has a first cover concave, or the second cover lateral has a second cover concave.

[0010] In an embodiment of the invention, the second cover lateral has a radian concaving towards the first cover lateral, or the first cover lateral has a radian concaving towards the second cover lateral.

[0011] In an embodiment of the invention, the connecting posts are grounding posts.

[0012] In an embodiment of the invention, each of the connecting posts has a rough surface, a bending portion or a cracking hole.

[0013] In an embodiment of the invention, the PCI-E connector cover further includes a third cover lateral, a first buckling portion and at least one second buckling portion. The third cover lateral is connected to at least two of the cover top surface, the first cover lateral and the second cover lateral, and is adapted to cover the third connector lateral. The first buckling portion is extended from the third cover lateral. The at least one second buckling portion is extended from the first cover lateral or the second cover lateral, where the first buckling portion and the at least one second buckling portion are adapted to bend for respectively buckling the connector bottom surface and the fourth connector lateral of the PCI-E connector.

[0014] In an embodiment of the invention, the at least one second buckling portion includes two second buckling portions respectively extended from the first cover lateral and the second cover lateral.

[0015] The invention provides a PCI-E connector module, which is adapted to be fixed to a main board, the PCI-E connector module includes a PCI-E connector and a PCI-E connector cover. The PCI-E connector includes a connector top surface and a connector bottom surface opposite to each other, a first connector lateral and a second connector lateral opposite to each other, a third connector lateral and a fourth connector lateral opposite to each other. The first connector lateral includes a first connector concave and a plurality of connector protrusions, the second connector lateral includes a second connector concave. The PCI-E connector cover includes a first cover lateral, a plurality of bending arms, a second cover lateral, a cover top surface and a plurality of connecting posts. The first cover lateral covers the first con-

nector lateral. The bending arms are connected to the first cover lateral and lean against the first connector concave to keep an interval between the first cover lateral and the first connector concave. The second cover lateral covers the second connector lateral. The cover top surface is connected to the first cover lateral and the second cover lateral, and covers the connector top surface. The connecting posts are extended from the first cover lateral and the second cover lateral, where the PCI-E connector cover is adapted to be connected to the main board through the connecting posts.

[0016] In an embodiment of the invention, the bending arms are extended from an edge of the first cover lateral and are bended towards the first connector concave.

[0017] In an embodiment of the invention, the bending arms are formed by cracking and bending a plurality partial regions of the first cover lateral at non-edge areas, such that the first cover lateral has a plurality of cracking holes besides the bending arms.

[0018] In an embodiment of the invention, the bending arms contact or do not contact the connector protrusions of the first connector lateral.

[0019] In an embodiment of the invention, the first cover lateral has a first cover concave, or the second cover lateral has a second cover concave.

[0020] In an embodiment of the invention, the second cover lateral has a radian concaving towards the first cover lateral, or the first cover lateral has a radian concaving towards the second cover lateral.

[0021] In an embodiment of the invention, the connecting posts are grounding posts.

[0022] In an embodiment of the invention, each of the connecting posts has a rough surface, a bending portion or a cracking hole.

[0023] In an embodiment of the invention, the PCI-E connector cover further includes a third cover lateral, a first buckling portion and at least one second buckling portion. The third cover lateral is connected to at least two of the cover top surface, the first cover lateral and the second cover lateral, and covers the third connector lateral. The first buckling portion is extended from the third cover lateral. The at least one second buckling portion is extended from the first cover lateral or the second cover lateral, where the first buckling portion and the at least one second buckling portion are adapted to bend for respectively buckling the connector bottom surface and the fourth connector lateral of the PCI-E connector.

[0024] In an embodiment of the invention, the at least one second buckling portion includes two second buckling portions respectively extended from the first cover lateral and the second cover lateral.

[0025] According to the above descriptions, the cover top surface of the PCI-E connector cover of the PCI-E connector module is connected to the first cover lateral and the second cover lateral, and the cover top surface, the first cover lateral and the second cover lateral are adapted to cover the connector top surface, the first connector lateral and the second connector lateral of the

PCI-E connector to enhance a structural strength of the PCI-E connector. Moreover, the bending arms connected to the first cover lateral lean against the first connector concave of the PCI-E connector, such that a certain interval is kept between the first cover lateral of the PCI-E connector cover and the first connector concave of the PCI-E connector to avoid a situation that the PCI-E connector cover is sunk and deformed under pressure. Moreover, the PCI-E connector cover is stably connected to the main board through the connecting posts in a welding manner.

[0026] In order to make the aforementioned and other features and advantages of the invention comprehensible, several exemplary embodiments accompanied with figures are described in detail below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] The accompanying drawings are included to provide a further understanding of the invention, and are incorporated in and constitute a part of this specification. The drawings illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention.

FIG. 1 is a schematic diagram of a conventional PCI-E connector.

FIG. 2 and FIG. 3 are respectively schematic diagrams of the conventional PCI-E connector of FIG. 1 viewing along different viewing angles.

FIG. 4 is a schematic diagram of a PCI-E connector module according to an embodiment of the invention. FIG. 5 to FIG. 8 are respectively schematic diagrams of the PCI-E connector module of FIG. 4 viewing along other viewing angles.

FIG. 9 is a partial schematic diagram of the PCI-E connector module of FIG. 4 viewing along other viewing angle.

FIG. 10 is a cross-sectional view of the PCI-E connector module of FIG. 5 along an A-A line.

FIG. 11 to FIG. 13 are respectively cross-sectional views of a plurality of PCI-E connector modules according to other embodiments of the invention.

FIG. 14 and FIG. 15 are partial schematic diagrams of the PCI-E connector module of FIG. 4 viewing along other viewing angles.

FIG. 16 is a cross-sectional view of the PCI-E connector cover of FIG. 6 along a B-B line.

DESCRIPTION OF EMBODIMENTS

[0028] FIG. 1 is a schematic diagram of a conventional PCI-E connector. FIG. 2 and FIG. 3 are respectively schematic diagrams of the conventional PCI-E connector of FIG. 1 viewing along different viewing angles. Referring to FIG. 1 to FIG. 3, the PCI-E connector 100 includes a connector top surface 110 and a connector bottom surface 120 opposite to each other, a first connector lateral

130 and a second connector lateral 140 opposite to each other, a third connector lateral 150 and a fourth connector lateral 160 opposite to each other.

[0029] The connector top surface 110 and the connector bottom surface 120 are respectively connected to the first connector lateral 130, the second connector lateral 140, the third connector lateral 150 and the fourth connector lateral 160. As shown in FIG. 1 and FIG. 2, the first connector lateral 130 includes a first connector concave 132 and a plurality of connector protrusions 134, where the connector protrusions 134 are closer to the connector top surface 110 compared with the first connector concave 132. Moreover, as shown in FIG. 3, the second connector lateral 140 includes a second connector concave 142. The fourth connector lateral 160 has an extending post 170 protruding out of the fourth connector lateral 160 and a pull knob 175 rotatably disposed on the extending post 170.

[0030] The PCI-E connector 100 can be disposed on a main board (not shown), and an expansion card (not shown) can be inserted into a slot on the connector top surface 110, such that the expansion card can be electrically connected to the main board through pins of the PCI-E connector 100. When the expansion card is to be unplugged, the pull knob 175 can be pushed to separate the expansion card from the slot of the connector top surface 110. The expansion card can be a display card, though the type of the expansion card is not limited thereto.

[0031] Generally, since a material of a casing of the PCI-E connector 100 is plastic, limited by such material, a structural strength of the PCI-E connector 100 is poor, and if the expansion card inserted in the PCI-E connector 100 is overweight, or if a user conducts an improper operation when unplugging the expansion card, the PCI-E connector 100 is probably cracked. In order to decrease a chance of cracking the PCI-E connector 100, the present embodiment provides a PCI-E connector module 10 having better structural strength, and details thereof are as follows.

[0032] FIG. 4 is a schematic diagram of a PCI-E connector module according to an embodiment of the invention. FIG. 5 to FIG. 8 are respectively schematic diagrams of the PCI-E connector module of FIG. 4 viewing along other viewing angles. FIG. 9 is a partial schematic diagram of the PCI-E connector module of FIG. 4 viewing along other viewing angle. FIG. 10 is a cross-sectional view of the PCI-E connector module of FIG. 5 along an A-A line. As shown in FIG. 4, the PCI-E connector module 10 of the present embodiment includes the conventional PCI-E connector 100 and a PCI-E connector cover 200 covering the conventional PCI-E connector 100. In the following figures, the PCI-E connector cover 200 is shown in bold lines to clearly distinguish the PCI-E connector cover 200 and the PCI-E connector 100. In the present embodiment, by covering the PCI-E connector cover 200 with a metal material on the general PCI-E connector 100, the structural strength of the PCI-E con-

nector 100 is enhanced.

[0033] In detail, as shown in FIG. 4 to FIG. 10, in the present embodiment, the PCI-E connector cover 200 includes a cover top surface 210, a first cover lateral 220, a plurality of bending arms 225, a second cover lateral 230, a third cover lateral 240 and a plurality of connecting posts 250.

[0034] The cover top surface 210 is connected to the first cover lateral 220 and the second cover lateral 230. The third cover lateral 240 is connected to at least two of the cover top surface 210, the first cover lateral 220 and the second cover lateral 230. In the present embodiment, the third cover lateral 240 is connected to the first cover lateral 220 and the second cover lateral 230. The cover top surface 210, the first cover lateral 220, the second cover lateral 230 and the third cover lateral 240 of the PCI-E connector cover 200 are respectively adapted to cover the connector top surface 110, the first connector lateral 130, the second connector lateral 140 and the third connector lateral 150 of the PCI-E connector 100, so as to protect the PCI-E connector 100.

[0035] As shown in FIG. 8 to FIG. 10, in the present embodiment, the bending arms 225 are connected to the first cover lateral 220 and lean against the first connector lateral 130 to keep an interval between the first cover lateral 220 of the PCI-E connector cover 200 and the first connector concave 132 of the PCI-E connector 100. To be specific, the bending arms 225 are extended from an edge of the first cover lateral 220 and are bended towards the first connector concave 132. When the PCI-E connector cover 200 covers the PCI-E connector 100, although the second cover lateral 230 of the PCI-E connector cover 200 directly contacts the second connector lateral 140 of the PCI-E connector 100, since the first cover lateral 220 of the PCI-E connector cover 200 does not directly contact the first connector concave 132 of the PCI-E connector 100, the first cover lateral 220 of the PCI-E connector cover 200 is liable to be deformed under pressure.

[0036] Therefore, in the PCI-E connector cover 200 of the present embodiment, as the bending arms 225 lean against the first connector concave 132, an interval can be kept between the first cover lateral 220 of the PCI-E connector cover 200 and the first connector concave 132 of the PCI-E connector 100. In this way, when the user takes the PCI-E connector cover 200, the first cover lateral 220 of the PCI-E connector cover 200 is not liable to concave inward to have a deformation due to excessive force exerted by the user.

[0037] Certainly, only one implementation and configuration positions of the bending arms 225 are described in the aforementioned embodiment, though implementation and configuration positions of the bending arms 225 are not limited thereto, and other implementation of the bending arms is provided below for reference. FIG. 11 to FIG. 13 are respectively cross-sectional views of a plurality of PCI-E connector modules according to other embodiments of the invention. In FIG. 11 to FIG. 13, the

PCI-E connector modules adopt the conventional PCI-E connector 100 in FIG. 1, and differences therebetween lie in different implementations of the bending arms on the PCI-E connector cover. It should be noticed that since FIG. 11 to FIG. 13 adopt a same viewing angle with that of FIG. 10, one of the cross-sections of the first cover laterals 220a, 220b and 220c are schematically illustrated.

[0038] Referring to FIG. 11, in the embodiment of FIG. 11, partial regions of the first cover lateral 220a are cracked at non-edge areas and are bended towards the first connector concave 132 to form the bending arms 225a. Namely, the bending arms 225 are not located at the edge of the first cover lateral 220a. Moreover, since the bending arms 225a is formed by cracking the partial regions of the first cover lateral 220a, the first cover lateral 220a has a plurality of cracking holes 224a besides the bending arms 225a, and a size of the cracking hole 224a is substantially complied with a size of the bending arm 225a.

[0039] Referring to FIG. 12, a difference between the embodiment of FIG. 12 and the embodiment of FIG. 11 is that in the embodiment of FIG. 12, positions of the bending arms 225b are relatively high, and besides that the bending arms 225b lean against the first connector concave 132, the bending arms 225b also contact bottom surfaces of the connector protrusions 134. In this structure, besides that the bending arms 225b keeps a certain interval between the first cover lateral 220b of the PCI-E connector cover 200b and the first connector concave 132 of the PCI-E connector 100, since the bending arms 225b contact the bottom surfaces of the connector protrusions 134, an upward movement of the PCI-E connector cover 200b relative to the PCI-E connector 100 is limited, so as to achieve an effect that the PCI-E connector cover 200b is not easy to be separated from the PCI-E connector 100.

[0040] Referring to FIG. 13, in the embodiment of FIG. 13, there are two upper and lower bending arms 225c on the first cover lateral 220c at non-edge areas. In FIG. 13, the upper bending arms 225c are similar to the bending arms 225b of FIG. 12, and a difference between the embodiment of FIG. 13 and the embodiment of FIG. 12 lies in the lower bending arms 225c of FIG. 13. The lower bending arms 225c are also formed by cracking partial regions of the first cover lateral 220c at non-edge areas and bending the same towards the first connector concave 132. In FIG. 13, since the upper and lower bending arms 225c are formed by cracking the partial regions of the first cover lateral 220c, the first cover lateral 220c have corresponding cracking holes 224c between the upper and lower bending arms 225c, and a size of the cracking hole 224c is substantially complied with a total size of the upper and lower bending arms 225c.

[0041] It should be noticed that in FIG. 13, the sizes of the two bending arms 225c relative to the first cover lateral 220c are only illustrated schematically. Although the greater the sizes of the two bending arms 225c are, the

better interval is provided, since the bending arms 225c is formed by the partial regions of the first cover lateral 220c, when the sizes of the two bending arms 225c are excessively large, the sizes of the cracking holes 224c on the first cover lateral 220c are excessively large accordingly, such that a structural strength of the first cover lateral 220c is weakened. Therefore, a designer can design the sizes of the bending arms according to an actual design requirement to achieve a balance between the structural strength of the first cover lateral 220c and the interval between the first cover lateral 220c and the first connector concave 132. Certainly, in other embodiments, the two bending arms 225c located at different heights can also be staggered from each other without locating besides the same cracking hole 224c.

[0042] Referring to the embodiment of FIG. 4 to FIG. 7, in the present embodiment, the PCI-E connector cover 200 further includes a plurality of connecting posts 250. The connecting posts 250 are extended from the first cover lateral 220 and the second cover lateral 230, such that the PCI-E connector cover 200 can be connected to the main board through the connecting posts 250. Namely, the PCI-E connector cover 200 of the present embodiment can be fixed to the main board together with the pins of the PCI-E connector 100 though the connecting posts 250 (for example, the connecting posts 250 and the pins of the PCI-E connector 100 are inserted to corresponding holes on the main board, and a solder is filled therein), such that the PCI-E connector cover 200 can stably cover the PCI-E connector 100.

[0043] In the present embodiment, the number of the connecting posts 250 extended from the first cover lateral 220 is three, and the number of the bending arms 225 extended from the first cover lateral 220 is five, and the five bending arms 225 are located close to the connecting posts 250 of the first cover lateral 220. By configuring the bending arms 225 close to the connecting posts 250, the first cover lateral 220 of the PCI-E connector cover 200 is avoided to be deformed inward, so as to facilitate aligning the connecting posts 250 with the corresponding holes on the main board. Certainly, the numbers and positions of the connecting posts and the bending arms 225 are not limited thereto.

[0044] As shown in FIG. 4 to FIG. 7, in the present embodiment, the connecting post 250 has a rough surface 252, which may increase adhesion of the solder. In the present embodiment, the rough surface 252 have a plurality of diamond protrusions (FIG. 15), such that the surface is not flat and smooth, and the rough surface 252 can be formed through stamping. However, in other embodiment, regular or irregular stripes can be scratched on the connecting posts 250 to form the rough surface 252. Alternatively, the rough surface 252 can be formed on the connecting posts 250 through sandblasting. The patterns and methods for forming the rough surface 252 on the connecting posts 250 are not limited to the aforementioned description.

[0045] Certainly, in other embodiments, a connection

strength for connecting the connecting posts 250 to the main board can be enhanced through other methods. For example, unbroken bending portions or broken cracking holes can be formed on the connecting posts 250 through stamping. When the connecting posts 250 are fixed to the main board, a part of the solder is filled in a concave part of the bending portion or in the cracking holes, so as to enhance the connection strength for connecting the connecting posts 250 to the main board.

[0046] It should be noticed that in the present embodiment, the connecting posts 250 are grounding posts, namely, when the connecting posts 250 are fixed to the main board, the connecting posts 250 contact a grounding line of the main board to achieve a grounding effect. Namely, besides that the connecting posts 250 of the PCI-E connector cover 200 have a fixing function, the connecting posts 250 may also provide an electromagnetic interference protection effect to the PCI-E connector 100.

[0047] Moreover, in the present embodiment, in order to avoid decreasing a space on the main board due to configuration of the PCI-E connector cover 200 on the PCI-E connector 100, a thickness of the PCI-E connector cover 200 is limited. For example, in the present embodiment, the thickness of the PCI-E connector cover is about 0.3 cm. However, such thin metal plate generally has poor rigidity, in the present embodiment, the first cover lateral 220 and the second cover lateral 230 of the PCI-E connector cover 200 have a special design, such that the PCI-E connector cover 200 with a smaller thickness still has an enough strength to protect the PCI-E connector 100.

[0048] Further, in the present embodiment, the first cover lateral 220 has a first cover concave 222, and the second cover lateral 230 has a second cover concave 232. Since a rigidity of the metal is enhanced after bending and stamping of the metal, the whole structural strength of the PCI-E connector cover 200 of the present embodiment is further enhanced through the bended first cover concave 222 and the bended second cover concave 232. Certainly, in other embodiments, an implementation that only the first cover lateral 220 has the first cover concave 222, or only the second cover lateral 230 has the second cover concave 232 is also applicable.

[0049] It should be noticed that in the present embodiment, shapes and positions of the first cover concave 222 and the second cover concave 232 are not particularly complied with the shapes and positions of the first connector concave 132 and the second connector concave 142. Namely, the first cover concave 222 and the second cover concave 232 of the PCI-E connector cover 200 are not matched in contours with the first connector concave 132 and the second connector concave 142 of the PCI-E connector 100.

[0050] Certainly, in other embodiments, the shapes and positions of the first cover concave 222 and the second cover concave 232 can also be complied with the shapes and positions of the first connector concave 132

and the second connector concave 142. Namely, in other embodiments, the first cover concave 222 and the second cover concave 232 of the PCI-E connector cover 200 are matched in contours with the first connector concave 132 and the second connector concave 142 of the PCI-E connector 100. Moreover, such match design results in a fact that the PCI-E connector cover 200 has a smaller volume. In other words, when the PCI-E connector cover 200 and the PCI-E connector 100 are all assembled to the main board, a relatively less space on the main board is occupied.

[0051] FIG. 14 and FIG. 15 are partial schematic diagrams of the PCI-E connector module of FIG. 4 viewing along other viewing angles. Referring to FIG. 14 and FIG. 15, in the present embodiment, the PCI-E connector cover 200 is fixed on the PCI-E connector 100 through buckling. The PCI-E connector cover 200 further includes a first buckling portion 260 and at least one second buckling portion 270. In detail, in the present embodiment, the first buckling portion 260 is extended from the third cover lateral 240. The number of the at least one second buckling portion 270 is four, where two of the second buckling portions 270 are extended from the first cover lateral 220, and the other two second buckling portions 270 are extended from the second cover lateral 230.

[0052] When the PCI-E connector cover 200 covers the PCI-E connector 100, the cover top surface 210 of the PCI-E connector cover 200 covers the connector top surface 110 of the PCI-E connector 100, the first buckling portion 260 of the PCI-E connector cover 200 can be bended for buckling the connector bottom surface 120 (shown in FIG. 8, FIG. 9 and FIG. 14) of the PCI-E connector 100, and the second buckling portions 270 respectively extended from the first cover lateral 220 and the second cover lateral 230 are bended for buckling the fourth connector lateral 160 of the PCI-E connector 100 and are located under the extending post 170, such that the PCI-E connector 100 is limited within the PCI-E connector cover 200 along an up-down direction.

[0053] Meanwhile, the third cover lateral 240 of the PCI-E connector cover 200 covers the third connector lateral 150 of the PCI-E connector 100, and the four second buckling portions 270 of the PCI-E connector cover 200 are bended for buckling the fourth connector lateral 160 (shown in FIG. 4, FIG. 6 and FIG. 15) of the PCI-E connector 100, such that the PCI-E connector 100 is limited within the PCI-E connector cover 200 along a left-right direction.

[0054] Moreover, the bending arms 225 of the PCI-E connector cover 200 lean against the first connector concave 132 of the first connector lateral 130 of the PCI-E connector 100, the second cover lateral 230 of the PCI-E connector cover 200 covers the second connector lateral 140 of the PCI-E connector 100, and the two second buckling portions 270 extended from the first cover lateral 220 and one of the second buckling portions 270 extended from the second cover lateral 230 lean against two sides of the extending post 170, such that the PCI-E con-

connector 100 is limited within the PCI-E connector cover 200 along a front-rear direction.

[0055] Namely, in the present embodiment, the PCI-E connector cover 200 can be stably fixed to the PCI-E connector 100 along three-dimensional directions through the aforementioned structural design, so as to avoid shaking and shift. It should be noticed that only one implementation of fixing the PCI-E connector cover 200 to the PCI-E connector 100 is described, and in other embodiments, the number and positions of the second buckling portions 270 are not limited thereto.

[0056] Moreover, in order to ensure that the second cover lateral 230 of the PCI-E connector cover 200 is closely attached to the second connector lateral 140 of the PCI-E connector 100 when the PCI-E connector cover 200 is installed to the PCI-E connector 100, the PCI-E connector cover 200 is tightly fixed to the PCI-E connector 100 along the front-rear direction. FIG. 16 is a cross-sectional view of the PCI-E connector cover of FIG. 6 along a B-B line. It should be noticed that FIG. 16 only illustrates a cross-section of the PCI-E connector cover 200 along the B-B-line of FIG. 6 without illustrating the PCI-E connector 100, and in FIG. 16, the PCI-E connector cover 200 is not yet installed on the PCI-E connector 100.

[0057] Referring to FIG. 6 and FIG. 16, in the present embodiment, the second cover lateral 230 has a radian concaving towards the first cover lateral 220. In the present embodiment, since the PCI-E connector cover 200 made of a metal material is slightly flexible, based on the design that the second cover lateral 230 has the radian, when the PCI-E connector cover 200 is installed on the PCI-E connector 100, the PCI-E connector 100 slightly expands the PCI-E connector cover 200, such that the second cover lateral 230 of the PCI-E connector cover 200 can be closely attached to the second connector lateral 140 of the PCI-E connector 100.

[0058] Certainly, in other embodiments, the first cover lateral 220 may have a radian concaving towards the second cover lateral 230 to make the PCI-E connector cover 200 to be closely installed on the PCI-E connector 100 along the front-rear direction. Alternatively, in the other embodiments, both of the first cover lateral 220 and the second cover lateral 230 may have a radian concaving towards each other.

[0059] In summary, the cover top surface of the PCI-E connector cover of the PCI-E connector module of the invention is connected to the first cover lateral and the second cover lateral, and the cover top surface, the first cover lateral and the second cover lateral are adapted to cover the connector top surface, the first connector lateral and the second connector lateral of the PCI-E connector to enhance a structural strength of the PCI-E connector. Moreover, the bending arms connected to the first cover lateral lean against the first connector concave of the PCI-E connector, such that a certain interval is kept between the first cover lateral of the PCI-E connector cover and the first connector concave of the PCI-E con-

connector to avoid a situation that the PCI-E connector cover is sunk and deformed under pressure. Moreover, the PCI-E connector cover is stably connected to the main board through the connecting posts in a welding manner.

Claims

1. A PCI-E connector cover (200), adapted to cover a PCI-E connector (100) and fixed to a main board, wherein the PCI-E connector (100) comprises a connector top surface (110) and a connector bottom surface (120) opposite to each other, a first connector lateral (130) and a second connector lateral (140) opposite to each other, a third connector lateral (150) and a fourth connector lateral (160) opposite to each other, the first connector lateral (130) comprises a first connector concave (132) and a plurality of connector protrusions (134), and the second connector lateral (140) comprises a second connector concave (142), the PCI-E connector cover (200) comprising:

a first cover lateral (220), adapted to cover the first connector lateral (130);

a plurality of bending arms (225), connected to the first cover lateral (220) and adapted for leaning against the first connector concave (132) to keep an interval between the first cover lateral (220) and the first connector concave (132);

a second cover lateral (230), adapted to cover the second connector lateral (140);

a cover top surface (210), connected to the first cover lateral (220) and the second cover lateral (230), and adapted to cover the connector top surface (110); and

a plurality of connecting posts (250), extended from the first cover lateral (220) and the second cover lateral (230), wherein the PCI-E connector cover (200) is adapted to be connected to the main board through the connecting posts (250).

2. The PCI-E connector cover as claimed in claim 1, wherein the bending arms (225) are extended from an edge of the first cover lateral (220) and are bended towards the first connector concave (132).

3. The PCI-E connector cover as claimed in claim 1, wherein the bending arms (225a, 225b, 225c) are formed by cracking and bending a plurality partial regions of the first cover lateral (220a, 220b, 220c) at non-edge areas, such that the first cover lateral (220a, 220b, 220c) has a plurality of cracking holes (224a, 224b, 224c) besides the bending arms (225a, 225b, 225c).

4. The PCI-E connector cover as claimed in claim 3, wherein the bending arms (225, 225a, 225b, 225c) contact or do not contact the connector protrusions

(134) of the first connector lateral (130).

5. The PCI-E connector cover as claimed in claim 1, wherein the first cover lateral (220) has a first cover concave (222), or the second cover lateral (230) has a second cover concave (232). 5
6. The PCI-E connector cover as claimed in claim 1, wherein the second cover lateral (230) has a radian concaving towards the first cover lateral (220), or the first cover lateral (220) has a radian concaving towards the second cover lateral (230). 10
7. The PCI-E connector cover as claimed in claim 1, wherein the connecting posts (250) are grounding posts. 15
8. The PCI-E connector cover as claimed in claim 1, wherein each of the connecting posts (250) has a rough surface (252), a bending portion or a cracking hole. 20
9. The PCI-E connector cover as claimed in claim 1, further comprising: 25
 - a third cover lateral (240), connected to at least two of the cover top surface (210), the first cover lateral (220) and the second cover lateral (230), and adapted to cover the third connector lateral (150); 30
 - a first buckling portion (260), extended from the third cover lateral (240); and
 - at least one second buckling portion (270), extended from the first cover lateral (220) or the second cover lateral (230), wherein the first buckling portion (260) and the at least one second buckling portion (270) are adapted to bend for respectively buckling the connector bottom surface (120) and the fourth connector lateral (160) of the PCI-E connector (100). 35 40
10. The PCI-E connector cover as claimed in claim 9, wherein the at least one second buckling portion (270) comprises two second buckling portions (270) respectively extended from the first cover lateral (220) and the second cover lateral (230). 45
11. A PCI-E connector module (10), adapted to be fixed to a main board, the PCI-E connector module (10) comprising: 50
 - a PCI-E connector (100), comprising:
 - a connector top surface (110);
 - a connector bottom surface (120), opposite to the connector top surface (110);
 - a first connector lateral (130), connected to the connector top surface (110) and the con-

nector bottom surface (120) and comprising a first connector concave (132);
 a second connector lateral (140), connected to the connector top surface (110) and the connector bottom surface (120) and opposite to the first connector lateral (130), and comprising a second connector concave (142);
 a third connector lateral (150), connected to the connector top surface (110), the connector bottom surface (120), the first connector lateral (130) and the second connector lateral (140); and
 a fourth connector lateral (160), opposite to the third connector lateral (150), and connected to the connector top surface (110), the connector bottom surface (120), the first connector lateral (130) and the second connector lateral (140); and

a PCI-E connector cover (200), disposed on the PCI-E connector (100), and comprising:

a first cover lateral (220), covering the first connector lateral (130);
 a plurality of bending arms (225), connected to the first cover lateral (220) and leaning against the first connector concave (132) to keep an interval between the first cover lateral (220) and the first connector concave (132);
 a second cover lateral (230), covering the second connector lateral (140);
 a cover top surface (210), connected to the first cover lateral (220) and the second cover lateral (230), and covering the connector top surface (110); and
 a plurality of connecting posts (250), extended from the first cover lateral (220) and the second cover lateral (230), wherein the PCI-E connector cover (200) is adapted to be connected to the main board through the connecting posts (250).

12. The PCI-E connector module as claimed in claim 11, wherein the bending arms (225) are extended from an edge of the first cover lateral (220) and are bended towards the first connector concave (132).
13. The PCI-E connector module as claimed in claim 11, wherein the bending arms (225a, 225b, 225c) are formed by cracking and bending a plurality partial regions of the first cover lateral (220a, 220b, 220c) at non-edge areas, such that the first cover lateral (220a, 220b, 220c) has a plurality of cracking holes (224a, 224b, 224c) besides the bending arms (225a, 225b, 225c). 55

14. The PCI-E connector module as claimed in claim 13, wherein the bending arms (225, 225a, 225b, 225c) contact or do not contact the connector protrusions (134) of the first connector lateral (130). 5
15. The PCI-E connector module as claimed in claim 11, wherein the first cover lateral (220) has a first cover concave (222), or the second cover lateral (230) has a second cover concave (232). 10
16. The PCI-E connector module as claimed in claim 11, wherein the second cover lateral (230) has a radian concaving towards the first cover lateral (220), or the first cover lateral (220) has a radian concaving towards the second cover lateral (230). 15
17. The PCI-E connector module as claimed in claim 11, wherein the connecting posts (250) are grounding posts. 20
18. The PCI-E connector module as claimed in claim 11, wherein each of the connecting posts (250) has a rough surface (252), a bending portion or a cracking hole. 25
19. The PCI-E connector module as claimed in claim 11, wherein the PCI-E connector cover (200) further comprises:
- a third cover lateral (240), connected to at least two of the cover top surface (210), the first cover lateral (220) and the second cover lateral (230), and covering the third connector lateral (150); 30
- a first buckling portion (260), extended from the third cover lateral (240); and 35
- at least one second buckling portion (270), extended from the first cover lateral (220) or the second cover lateral (230), wherein the first buckling portion (260) and the at least one second buckling portion (270) are bent for respectively buckling the connector bottom surface (120) and the fourth connector lateral (160) of the PCI-E connector (100). 40
20. The PCI-E connector module as claimed in claim 19, wherein the at least one second buckling portion (270) comprises two second buckling portions (270) respectively extended from the first cover lateral (220) and the second cover lateral (230). 45
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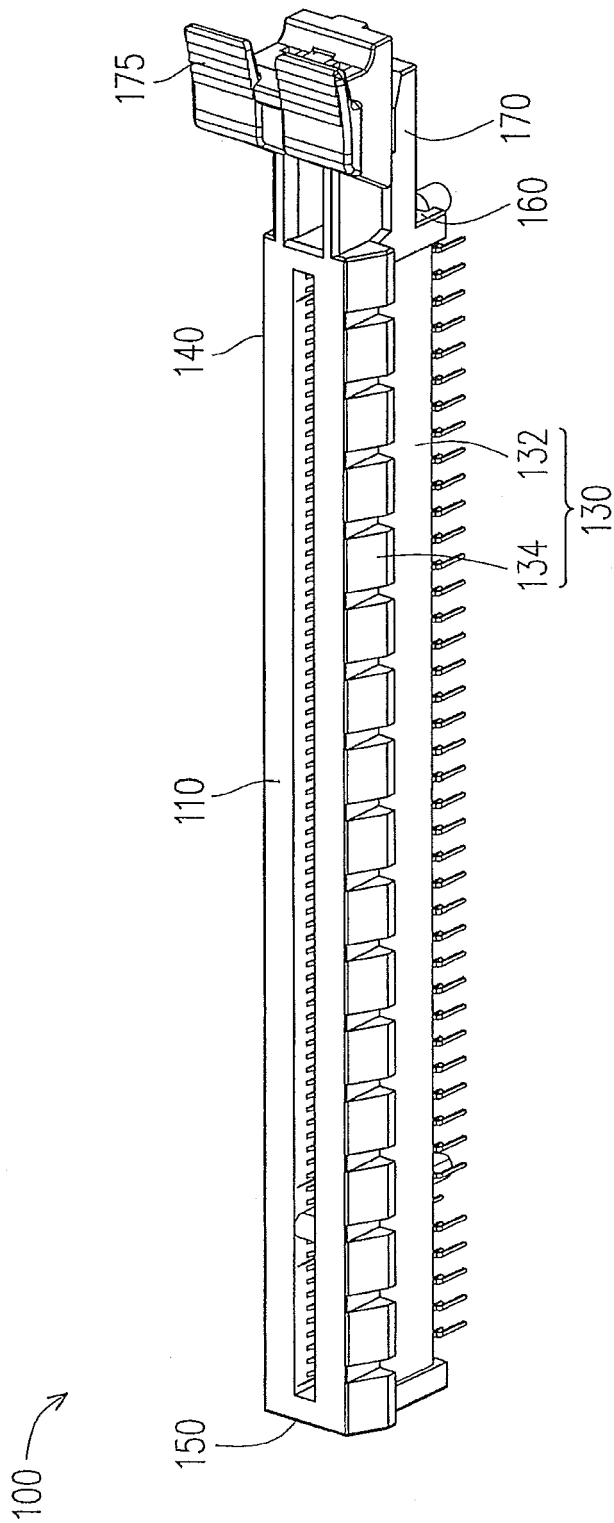


FIG. 1 (RELATED ART)

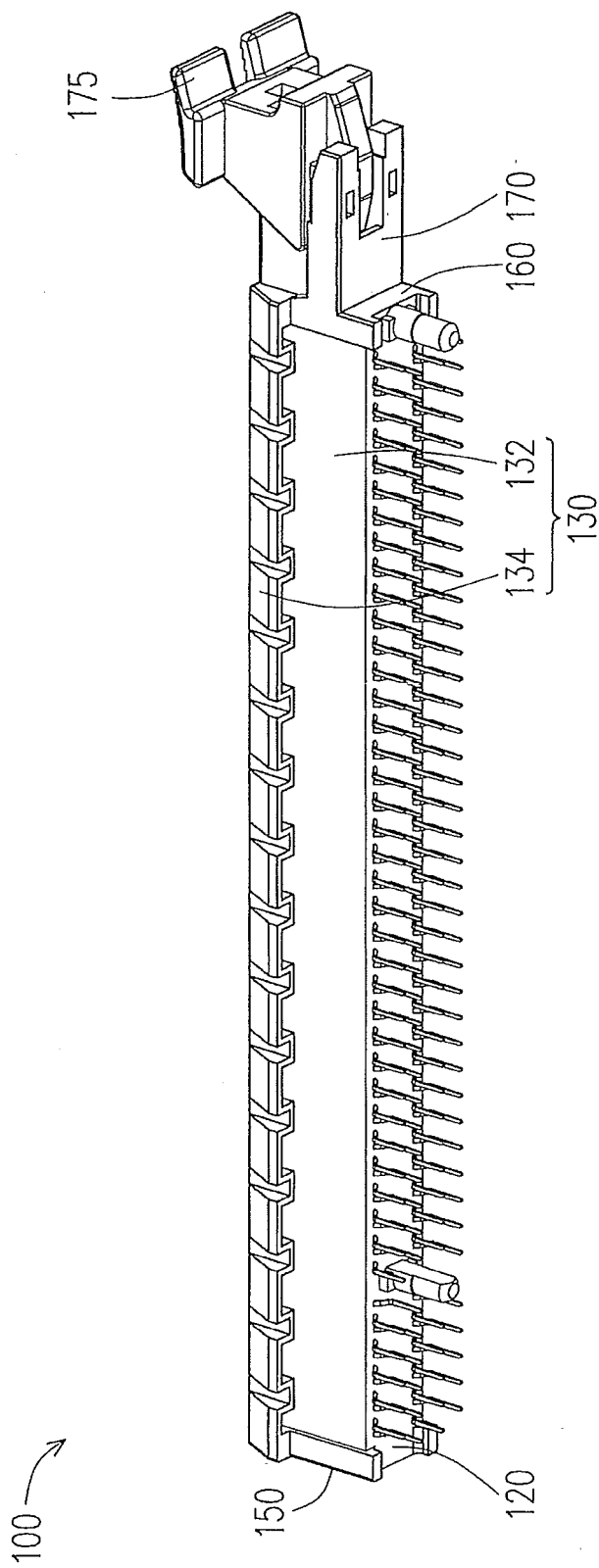


FIG. 2 (RELATED ART)

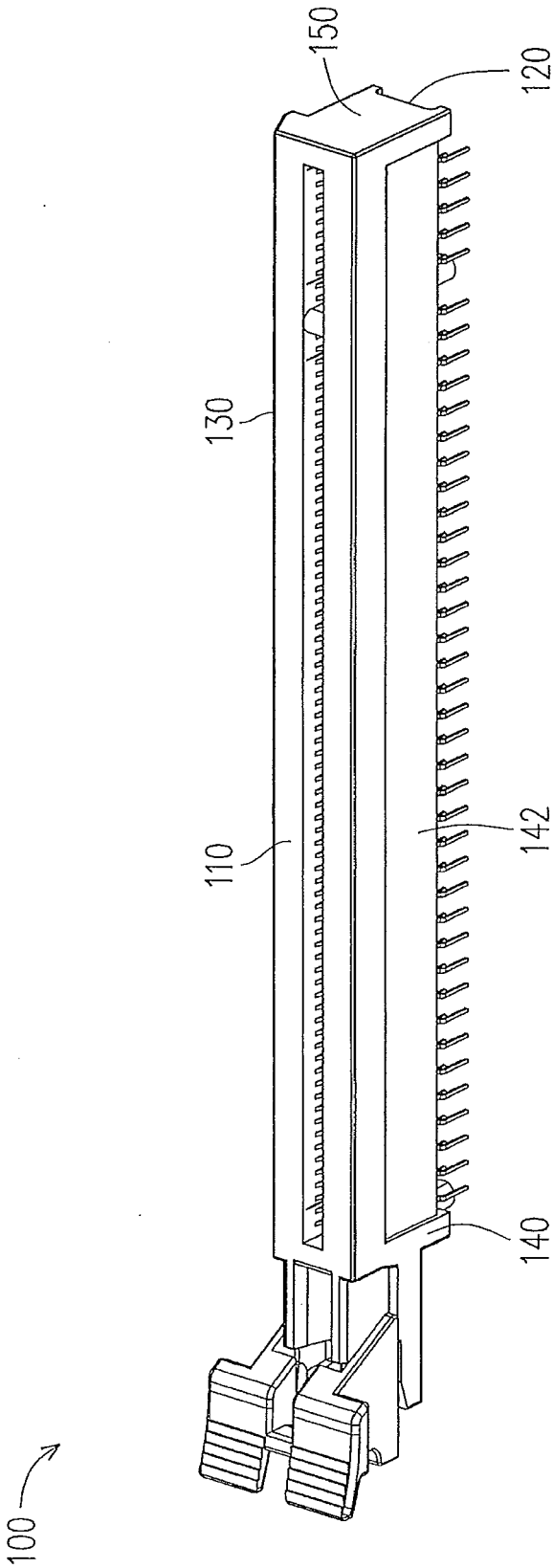


FIG. 3 (RELATED ART)

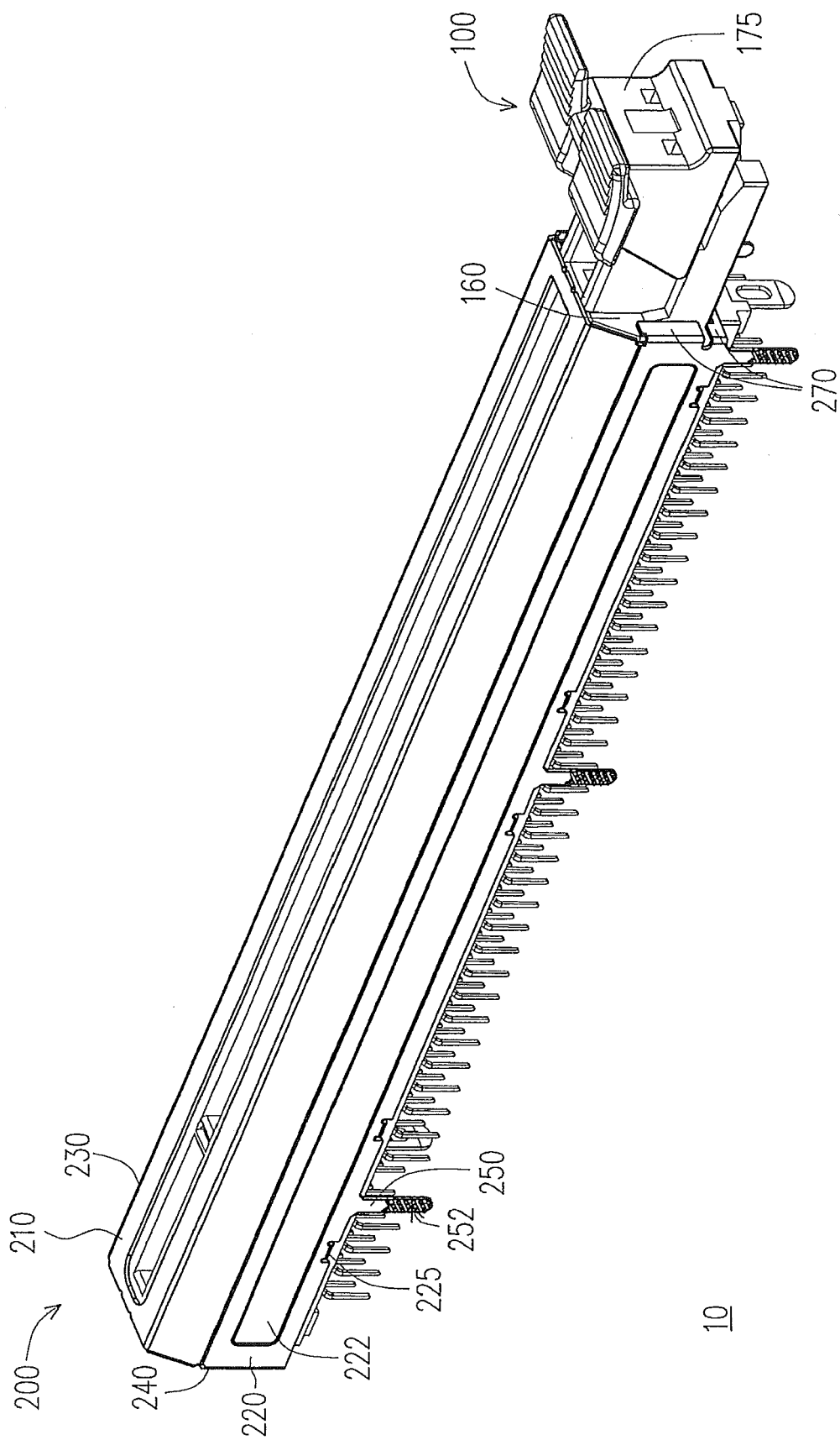


FIG. 4

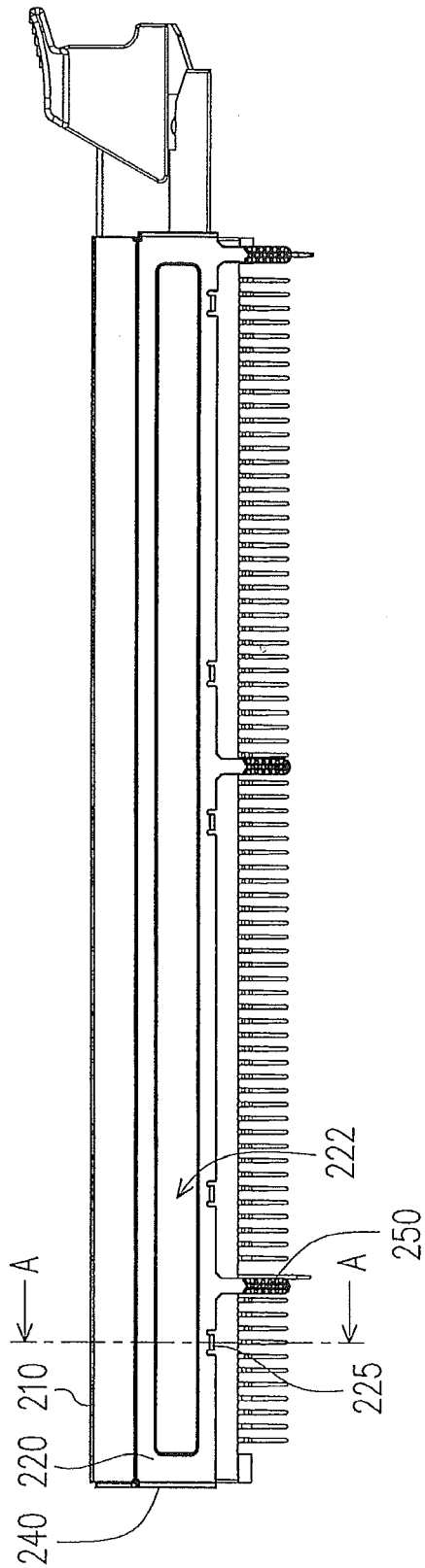


FIG. 5

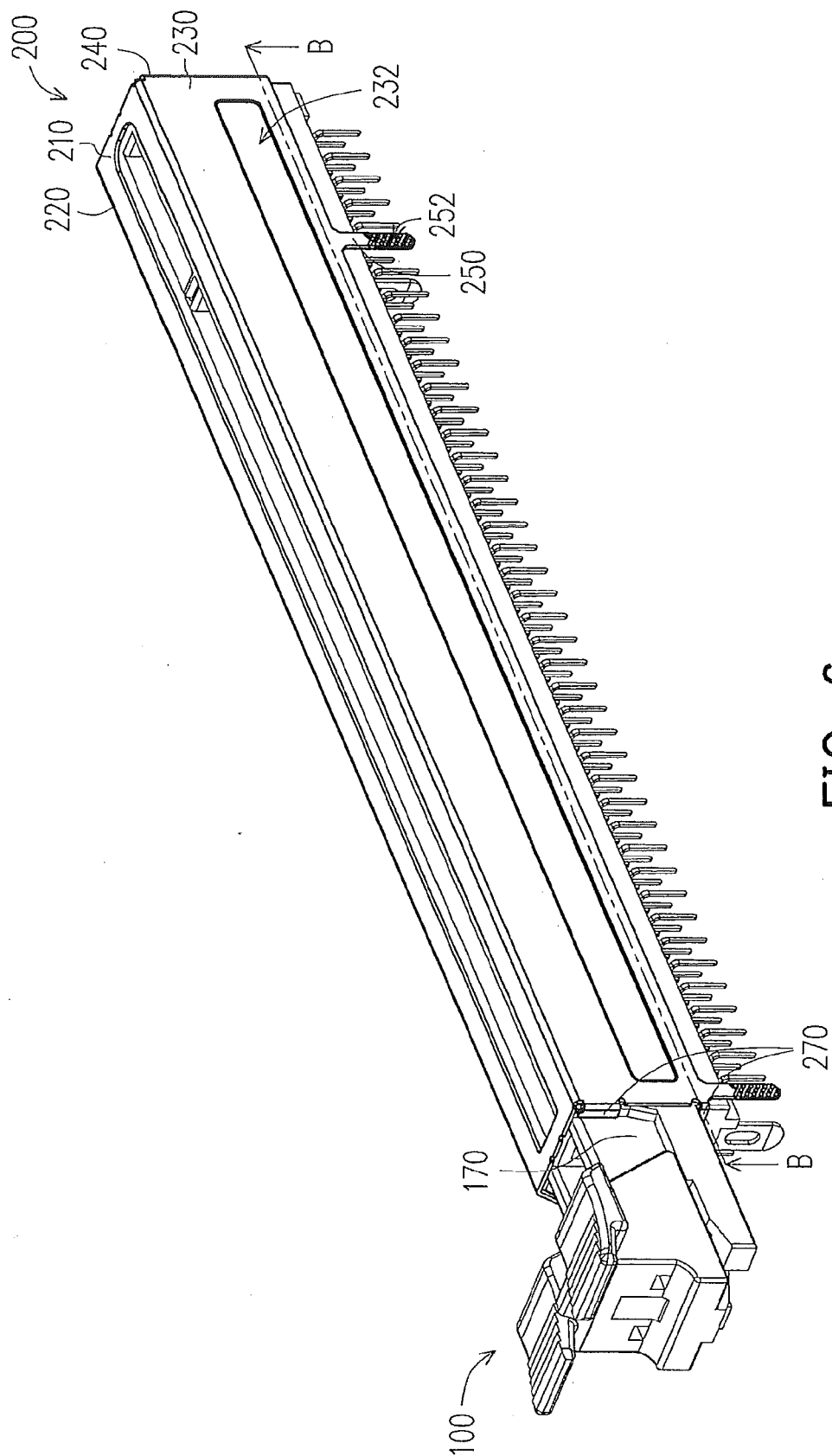


FIG. 6

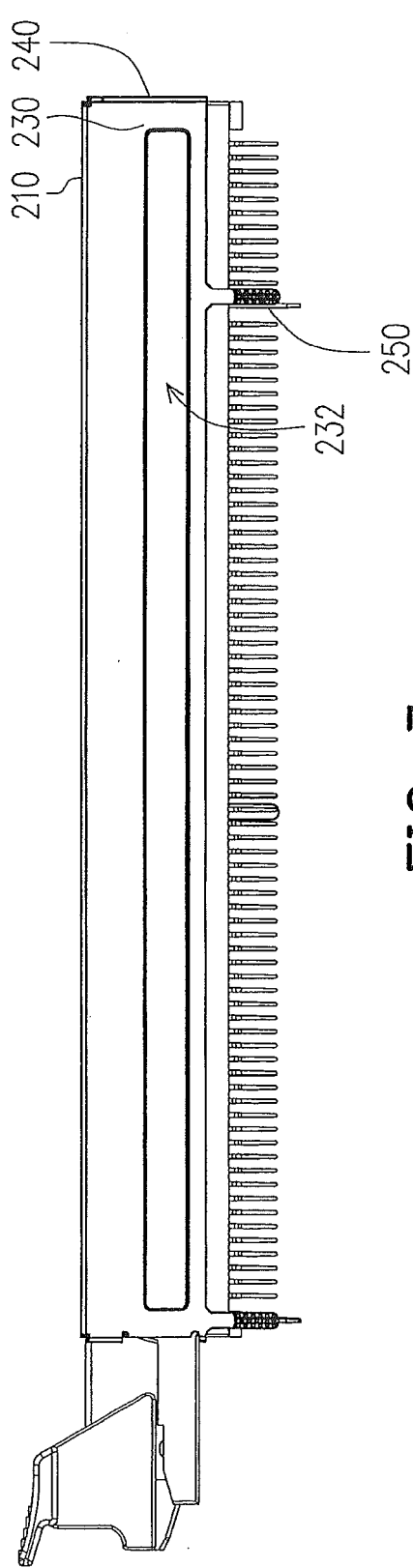


FIG. 7

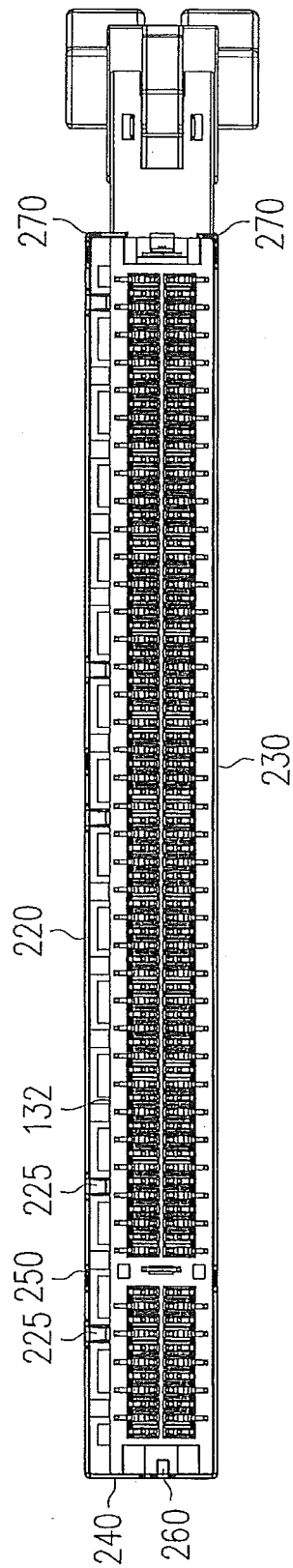


FIG. 8

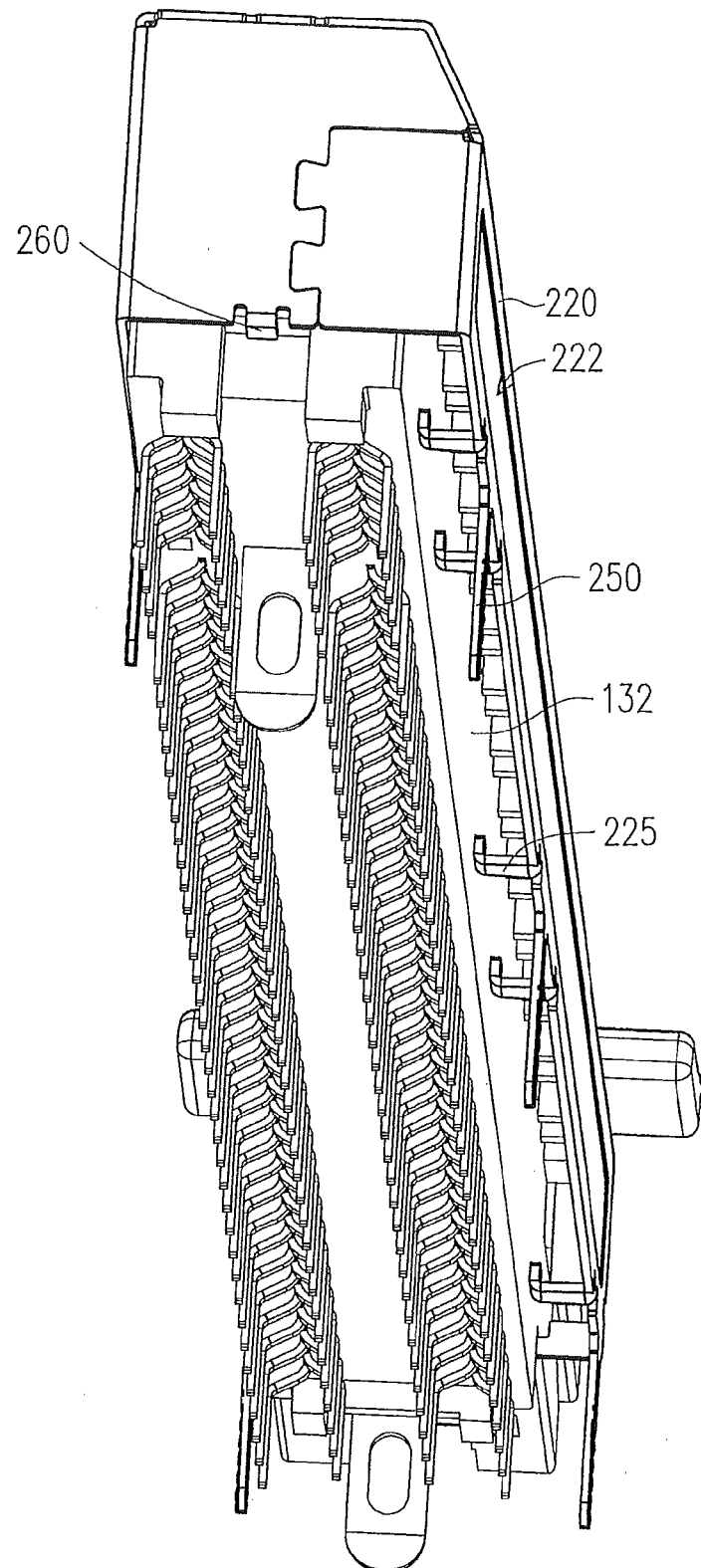


FIG. 9

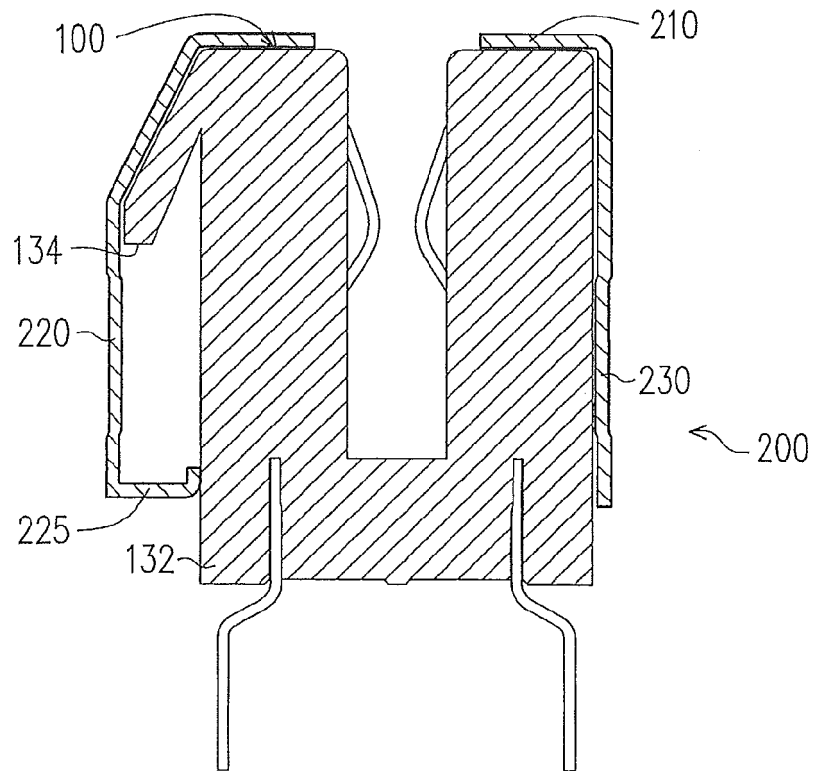


FIG. 10

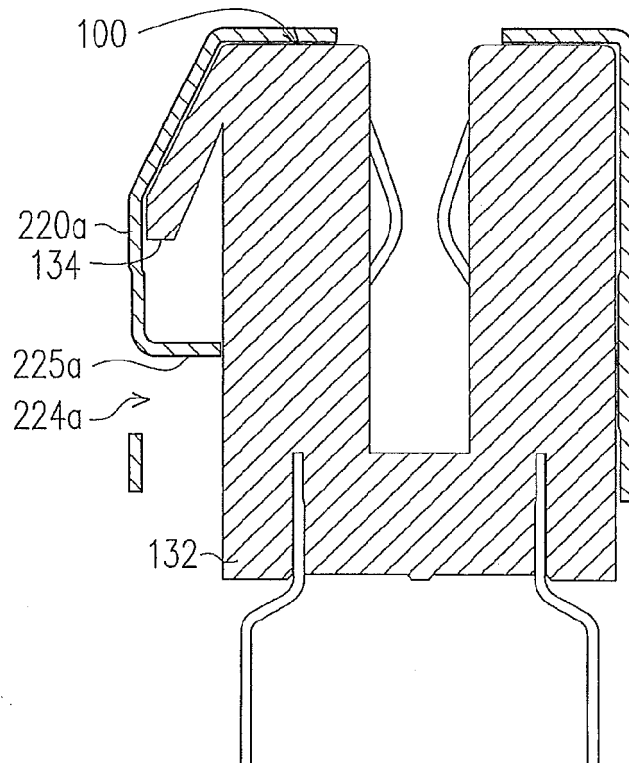


FIG. 11

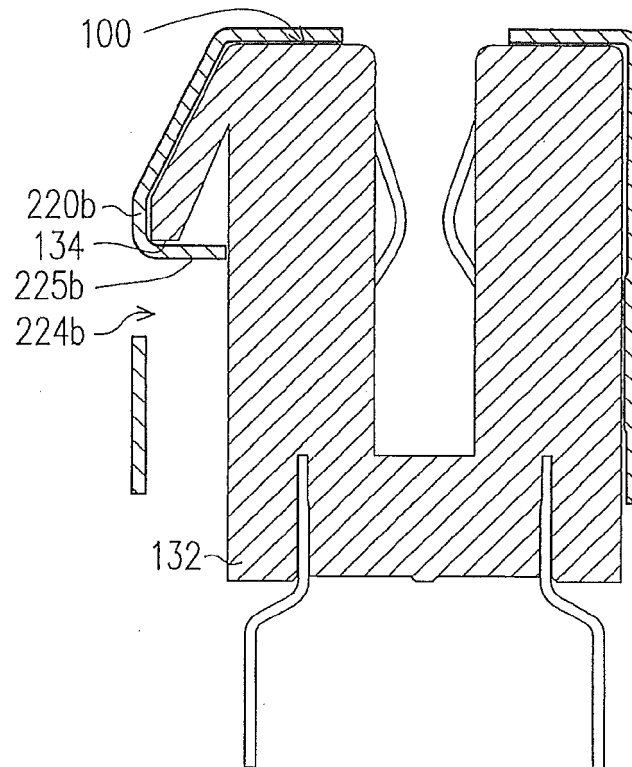


FIG. 12

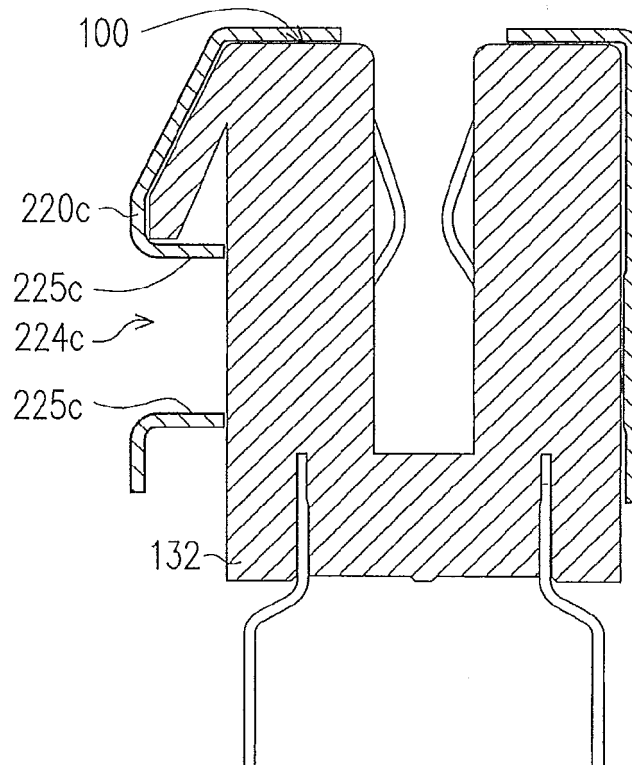


FIG. 13

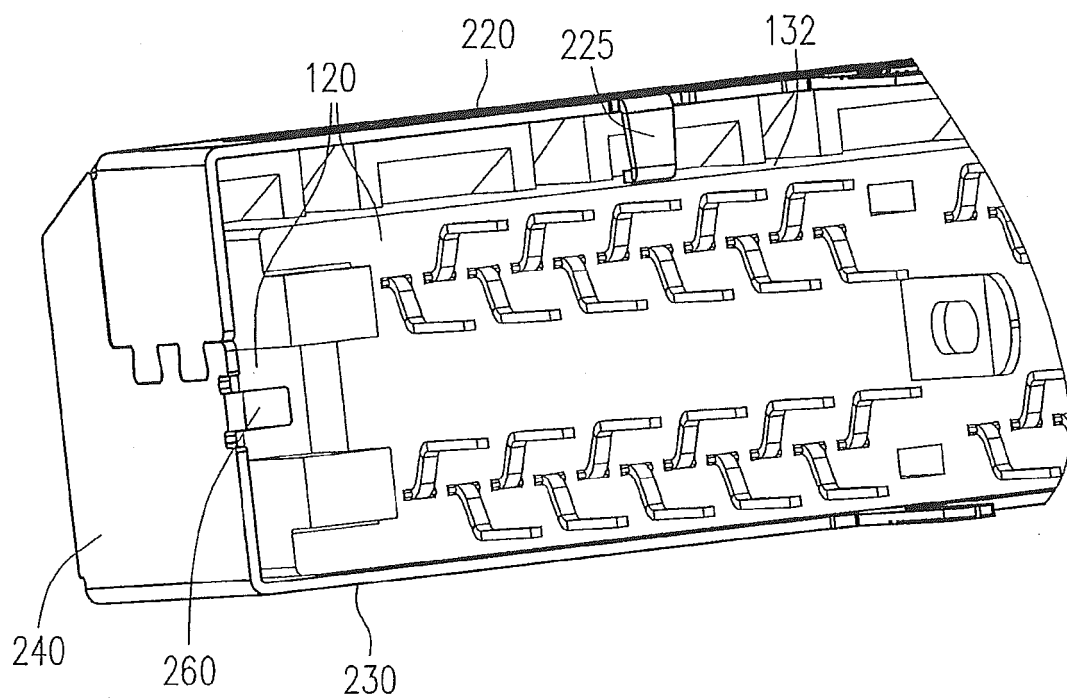


FIG. 14

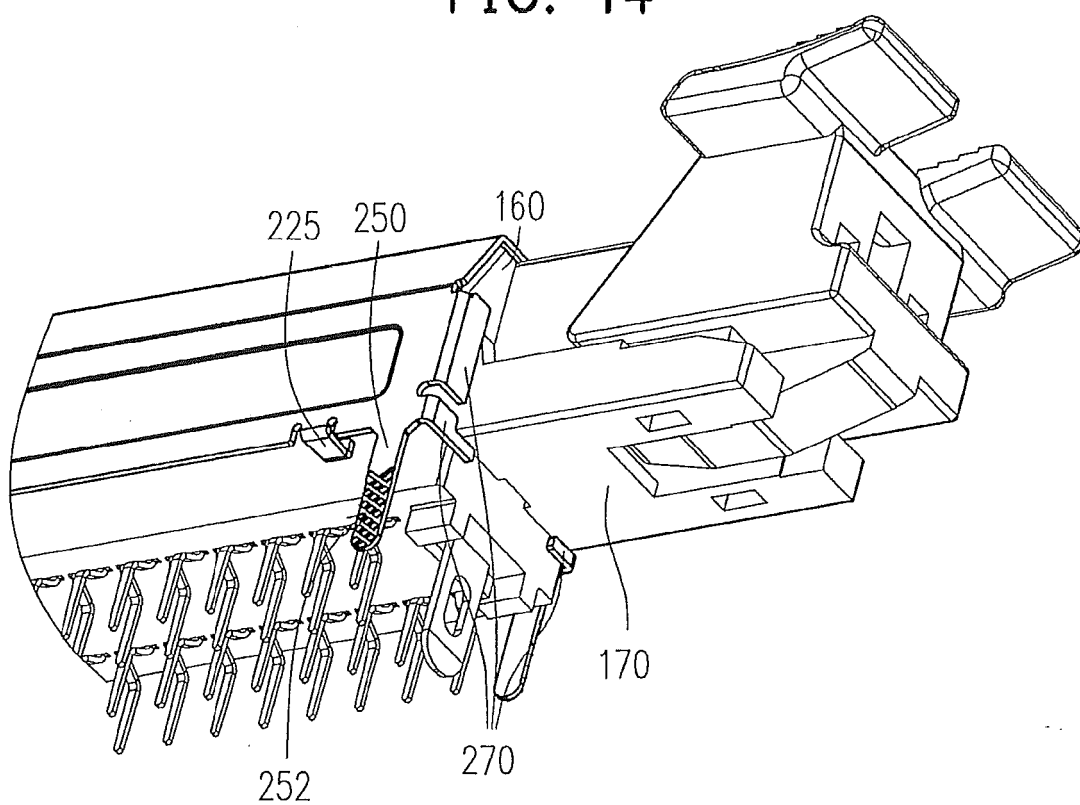


FIG. 15

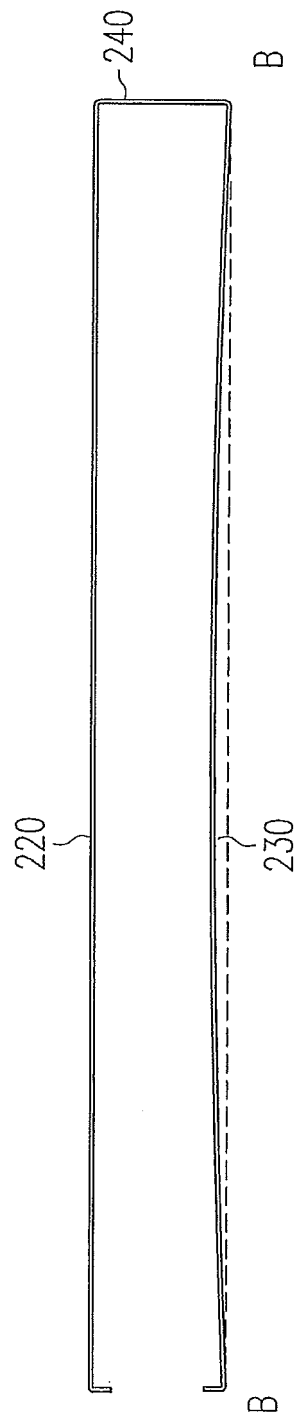


FIG. 16



EUROPEAN SEARCH REPORT

 Application Number
 EP 15 18 4068

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Y	US 2007/155245 A1 (TSAI CHOU H [TW]) 5 July 2007 (2007-07-05) * paragraph [0027] - paragraph [0031]; figure 3 *	1-20	ADD. H01R24/60
Y	US 2005/277334 A1 (HUANG CHIEN-HSUN [TW]) 15 December 2005 (2005-12-15) * paragraph [0017] - paragraph [0020]; figures 1-3 *	1-20	
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			H01R
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 22 September 2016	Examiner Bouhana, Emmanuel
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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ON EUROPEAN PATENT APPLICATION NO.**

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The members are as contained in the European Patent Office EDP file on
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